THE SEVERELY VISUALLY HANDICAPPED: THEIR MOBILITY AND WILLINGNESS TO MOBILITY TRAINING

JAAKKO VIHMAA

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Abstract

The aim of the study was to help to arrange mobility training for persons with severe visual handicaps, and to guide these persons to such training. Towards this aim, visually handicapped adults were described, and a study was made of their willingness to mobility training and their mobility on foot and by public transport

'Mobility' means moving on foot outside the immediate home area or using public transport beyond the usual walking distance. 'Willingness to mobility training' means the wich of a visually impaired person to receive training associated with his mobility.

The basic population in the study consisted of 4 200 members of regional associations of Finland's Central Association of the Visually Handicapped. The sample included 420 persons between the ages 17 and 64, of whom 389 (92.6%) could be interviewed. The study did not include deaf-blind persons or persons with additional handicaps.

The interviewes included 217 men (56 %) and 172 women (44 %). Their average age was 44 years. 58 % of the persons were 41 to 64 years old. Persons with low vision accounted for 23 %, and blind persons for 60 % (17 % unspecified). The degree of disability was 100 % with 62 % of the persons, and 60 to 99 % with 38 %.

According to their own estimates, the visually handicapped walked an average of 3 kilometers daily. At the time of the study the average daily distance walked by Finns was 1.15 km. The findings of the study indicate a positive picture of the mobility and its safety among the visually handicapped. It should be noted, however, that some of the visually impaired move only very seldom or only in the company of a seeing escort.

Mobility training for a particular visually impaired person should be planned according to his individual skills and needs. All members of the Central Association could be interviewed, and the regional secretaries could use the answers in guiding or motivating to mobility training.

The most significant independent variable in the mobility on foot of the visually handicapped was desire to mobility. This, and willingness to mobility training factors inherent in the disabled person. Further studies should particularly emphasize the problem of motivation.

Key words

blind, blindness, low vision, mobility, orientation physical handicap, public transport, visual impairment, visually handicapped, visually impaired, walking

Supplementary notes

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SUMMARY

The aim of the study was to help to arrange mobility training for persons with severe visual handicaps, and to guide these persons to such training. Towards this aim, visually handicapped adults were described, and a study was made of their willingness to mobility training and their mobility on foot and by public transport.

'Mobility' means moving on foot outside the immediate home area or using public transport beyond the usual walking distance. 'Willingness to mobility training' means the wish of a visually impaired person to receive training associated with his mobility.

The basic population in the study consisted of 4,200 members of regional associations of Finland's Central Association of the Visually Handicapped. The sample included 420 persons between the ages 17 and 64, of whom 389 (92.6 %) could be interviewed. The study did not include deaf-blind persons or persons with additional handicaps.

The study method was personal interviews by the Central Association's regional rehabilitation secretaries and their assistants. Pilot interviews were made in May 1980. The actual interview period was from August 1980 to March 1981. The interviewees included 217 men (56 %) and 172 women (44 %). Their average age was 44 years. 58 % of the persons were 41 to 64 years old. Persons with low vision accounted for 23 %, and blind persons for 60 % (17 % unspecified). The degree of disability was 100 % with 62 % of the persons, and 60 to 99 % with 38 %.

Concepts used in the study are explained in the table below. The dependent variables are on the right. Independent variables can be looked up on the left in the WHO disability categories, which contain variables associated with this study.

1. VISUAL DEFECT	2. IMPAIRED FUNCTIONALITY & COMPENSATION	3. SOCIAL DISADVANTAGE & COMPENSATION	4. PERSONAL CHARACTERISTICS	DEPENDENT VARIABLES
E.g.	E.g.	E.g.	E.g.	
Visual acuity	Degree of disability	Area: urban/ rural	Sex	WILLINGNESS TO MOBILITY TRAINING
Visual field quality	Need of guide	Distance from home to public transport	Age	MOBILITY:
	Use of guide		Education	- On foot
	Use of dog guide		Desire for mobility	- By public transport
	Use of white cane		Hobbies	
			Illnesses	
			Hearing	

In the descriptive problems the analysis method was frequency and percentage tables prepared on the basis of direct distributions. More information was obtained with chi-squared significance tests, which were also used to exclude variables for dependence analyses. Interactions between independent variables were searched by the Automatic Interaction Detector (AID).

The main results are described below in the order of the problems.

1. To what extent do persons with severe visual handicaps move on foot and by public transport?

Converted to a daily average, the distance moved on foot by the severely visually handicapped was 3 kilometres (n=382): 0.5 km/22.8 %, 1.5 km/20.7 %, 2.5 km/19.9 %, 3,5 km/8.1 % and 6.7 km/28.5 %. 38 % of the severely visually handicapped do not use public transport.

2. What is the willingness of the severely visually handicapped to move about, and what are the interactions to the visual defect, impaired functionality, social disadvantage and personal characteristics?

60 % of the severely visually handicapped wanted to move more than they did at the time of the interview. More moving was desired by those with 100 % disability ($p<.05$), those who were not active in sports ($p<.05$), women ($p<.01$), those who did not wish training ($p<.01$), those who wished rehabilitation ($p<.001$), and those who did not have a driving licence ($p<.05$).

3. What are the prerequisites for mobility as experienced by the severely visually handicapped, and what are their interactions with the visual defect impaired functionality, social disadvantage, and personal characteristics?

Every second (49.8 %) of the severely visually handicapped expressed the prerequisite for increased mobility to be the availability of a seeing guide. Most (43 %) of those who wished a guide belonged in visual acuity category 4 ($<0.02\geq$ light sense). 76 % of those who needed a guide had 100 % disability, and 80 % had no hobbies. The women wished a seeing guide, the men a motive for increased mobility.

4. To what extent are severely visually handicapped willing to mobility training, and which would be the best descriptive factors associated with visual disability, impaired functionality, social disadvantage and personal characteristics.

32 % of the severely visually handicapped wished mobility training. This willingness was apparent among those visually impaired persons who had hobbies (other than sports) ($p<.001$), expressed a desire of moving more ($p<.01$), used a white cane ($p<.05$), and had not attended a vocational school for the visually impaired ($p<.05$).

5. Which mobility aids do the severely visually handicapped use?

9.5 % of the severely visually handicapped told that they always needed a guide when moving outside. One out of four (25 %) always used a white cane, 12 % frequently. 10.3 % had a dog guide available. No other aids were reported.

6. What is the traffic environment of a severely visually handicapped person like, and how do the residence area and the time of moving thereto interact with the visual defect, impaired functionality, social disadvantage and personal characteristics?

38 % of the severely visually handicapped lived in cities or towns, 24 % in suburban areas, 19 % in built-up rural areas, and 19 % in sparsely populated rural areas. With 34 % the nearest bus stop or the like was at a distance not exceeding 100 metres. Over 70 % had lived in their present home areas for at least six years. Changing of the residence area after becoming disabled decreases as the age of becoming disabled increases.

7. To what extent is there an increased difficulty in the mobility of the severely visually handicapped caused by the traffic environment and conditions, weather and road conditions, and the perception of traffic lights?

54 % of the severely visually handicapped experience ice to hamper walking much or very much, and 41 % felt the same about snow. 36 % said that the perception of traffic lights impedes mobility much or very much.

8. What information helps a severely visually handicapped person's mobility in traffic, what is the source of the information, and what are the interactions between the source and the visual defect, impaired functionality, social disadvantage and personal characteristics?

46 % of the severely visually handicapped said that traffic training and knowledge of traffic rules were the most helpful in traffic. Every second (49 %) had received their information through experience.

9. Which skills help the mobility of the severely visually handicapped in traffic, and what are the interactions between the source of the skills and the visual defect, impaired functionality, social disadvantage and personal characteristics?

27 % said that hearing is the best aid in traffic. Routine and experience were mentioned by one out of five (20 %), use of a cane by 17 %, and orientation skills by 13 %. The residual visual ability helped 9 % of the severely visually handicapped. Most (70 %) of the interviewed told that they had acquired their mobility skills through experience. Adjustment courses were reported by 15 %, and mobility courses by 7 %. Those in visual acuity categories 4 and 5 and those with 100 % disability had the most use of a cane and hearing in their mobility. Those who had attended adjustment courses had benefited most from training in orientation and cane skills.

10. How many and what kind of mishaps in traffic occur to the severely visually handicapped?

74 % of the severely visually handicapped had had no pedestrian mishaps during one year. One in four (26 %) had had a mishap, and most of these (17 %) not more than five times. The most frequent mishap was collision with an obstacle, the second and third most frequent being tripping and slipping.

11. In how many and in what kind of traffic accidents are the severely visually handicapped involved?

During one year nine of the visually handicapped had been involved in a total of 11 traffic accidents. The persons involved included six pedestrians (two with two accidents), two cyclists, and one mopedist. The injuries were slight, and none of the accidents resulted in a legal action. Alcohol was not involved in any of the accidents.

12. How is the extent of the mobility of severely visually handicapped persons explained by individual factors associated with visual defect, impaired functionality, social disadvantage and personal characteristics?

The following variables had at least an almost significant interaction with the mobility of a severely visually handicapped person (1) on foot: visual acuity ($p<.05$; mobility decreases with poorer acuity), need for a guide ($p<.01$; those who always require a guide are less mobile), use of a seeing helper ($p<.05$; persons having a helper are less mobile), use of a dog guide ($p<.05$; those using a dog guide are less mobile), experiencing ice as a difficulty ($p<.05$; this also reduces mobility), age ($p<.05$; older people are less mobile), interest in sports or keeping fit ($p<.001$; people who go in for sports or fitness move more), desire for mobility ($p<.001$; those who move little wish to move more); (2) by public transport: degree of visual defect severity ($p<.01$; mobility decreases with higher degrees of severity), need of guide ($p<.05$; those who always need a guide are less mobile), urban/rural quality of abode area ($p<.01$; persons living in the countryside move less), distance from home to public transport ($p<.05$; the closer a bus stop etc, the more the person moves), age ($p<.01$; young people move more), training in a vocational school for the visually impaired ($p<.01$; persons who have attended such schools move more).

Moving on foot was not explained by: degree of severity, use of white cane, abode area, snow, sex, age at onset of visual defect, duration of visual defect, level of education, attending a vocational school for the visually handicapped, or attending an adjustment course.

Use of public transport was not explained by: visual acuity, sex, age at onset of visual defect, duration of visual defect, or level of education.

13. How is the extent of moving on foot by the severely visually handicapped explained by interactions between factors associated with visual defect, impaired functionality, social disadvantage and personal characteristics?

The dependence percentage of the AID model was 28.8 %. Almost 12 % of moving on foot was explained by an active interest in sports or keep-fit excercises. Among the most mobile group "those active in sports or in keeping fit, using a dog guide and at least satisfied with their manner of mobility" the average distance moved daily was 4 kilometres ($n=17/354$, 4.8 %). The least mobile groups included "those not active in sports, who do not see street curbs and whose mobility is extremely impeded by ice". They moved daily an average of 1.2 kilometres ($n=39/354$, 11 %). The percentage was statistically very significant ($p<.001$).

14. How is the use of public transport by the severely visually handicapped explained by interactions between factors associated with visual defect, impaired functionality, social disadvantage and personal characteristics?

The AID model accounted for 23.8 %. Of "persons with an intermediate school or high school education, without guide", 77 % used public transport (n=61/279, 22 %). Of "persons with primary or vocational school education, having 100 % disability, who lived in sparsely populated rural areas, whose visual defect had begun under the age of 50", only 35 % were mobile (n=26/279, 9.3 %). The percentage was statistically very significant ($p<.001$).

According to their own estimates, the visually handicapped walked an average of 3 kilometres daily. At the time of the study the average daily distance walked by Finns was 1.15 km. The findings of the study indicate a positive picture of the mobility and its safety among the visually handicapped. It should be noted, however, that some of the visually impaired move only very seldom or only in the company of a seeing escort.

Mobility training for a particular visually impaired person should be planned according to his individual skills and needs. All members of the Central Association could be interviewed, and the regional secretaries could use the answers in guiding or motivating to mobility training.

The most significant independent variable in the mobility on foot of the visually handicappoed was desire to mobility. This, and willingness to mobility training factors inherent in the disabled person. Further studies should particularly emphasize the problem of motivation.

1. THE STUDY

The above summary describes the aim of the study, definitions, basic population and sample, the study method, processing of the findings, and answers to the problem setting. This English summary discusses in closer detail some of the study concepts and gives a more detailed description of the results to problems 4, 12, 13 and 14.

A table in the summary describes briefly the concepts used in the study. The dependent variables are mobility on foot and by public transport, and willingness to mobility training. Independent variables can be looked up on the left in the WHO-type categories, which include factors involved in the study.

The visual handicaps are classified by visual acuity and quality of the visual field. The classifications are based on the structure and functional defects of the visual organ, and are made for a particular purpose. In the context of mobility they should accordingly be regarded with certain qualifications. The mobility of a handicapped person is affected by many other factors as well, such as the desire and need of mobility, personal capabilities, possibilities offered by the environment, and other people's attitudes. An essential point is how the visually handicapped personally experiences his possibilities of mobility. The causes of the handicap are not included in the classification. The interviewees had been medically found to have severe visual handicaps; their visual acuity category is no higher than 0.3.

The functional difficulty is described by impaired functionality variables, in which the indicator is the disablement percentage, i.e. degree of disability. The persons studied meet the disability degree required for membership in Finland's Central Association of the Visually Handicapped. The category includes impaired functionality compensation by various aids. A handicap does not cause equal impaired functionality to all people, and all do not need such compensation measures.

Neither do all visually impaired experience their handicap as a social disadvantage, which means difficulties in getting along in the society. The 'hobbies' variable is included in personal characteristics, as hobbies depend on many factors. However, the impossibility of certaing hobbies due to the reduced functional ability caused by a visual handicap could be included in the social disadvantage category. In this study the latter category consists of mobility problems caused by the environment.

The fourth category concerns the visually handicapped persons' personal characteristics, including demographic data, illnesses, hobbies and desire of mobility.

1.1. Mobility and willingness to mobility training

Mobility, i.e. moving, is an element of human life and social participation. A seeing person's mobility is in general safe and trouble-free. He does not collide with obstacles or other pedestrians, nor does he walk in the way of an approaching vehicle. A person with normal sight does not get lost and does not experience any great stress about walking. He can move from one place to another by the most direct or convenient route. He has the choice of various routes according to his wish. He is able to anticipate problems far ahead.

In the case of a visually handicapped person mobility requires a lot. It is a great challenge, and failure to meet it means a resignation from the company of others and from everyday life. In addition to technical skill, setting out requires mental resources. Information pouring in from the available senses must constantly be filtered and analysed, and the handicapped person must know how to utilize this information. In particular the visually handicapped have to rely on the sense of hearing, which does not give such an overall picture of the environment as sight does. Sound stimuli get mixed, and distinguishing meaningful sounds from noise requires great vigilance. A cane, if used, supplies information on the road surface, changes in it, and possible obstacles, but obstacles above the waist must be identified by means of sound and obstacle sense. It is hard for a visually handicapped person to anticipate events ahead in the same way as a seeing person does when walking.

In the WHO categories mobility is a part of social disadvantages. It is a factor in any vocational, economic or social problems that the handicapped person may have. In this study mobility is considered a dependent variable, and the social disadvantage category includes such environmental factors that may hamper the mobility of the visually handicapped.

In this study mobility includes both familiarity with the environment and technical performance. Mobility is divided into moving on foot and travel by public transport. Mobility on foot means the scope of the visually handicapped person's walking outside the immediate home area. Mobility by public transport means the use of such transport and its extent beyond a normal walking distance. Mobility was evaluated by the interviewed persons themselves. The cause of moving was not specified; it includes both errand trips and recreation, i.e. business and pleasure.

The concept of mobility training involves independent, purposeful mobility. Willingness to mobility training means a visually handicapped person's desire to get learn the necessary skills for better moving.

1.2. Visual acuity, degree of disability and ability to see objects

Visual acuity was determined for 83.3 % (324) of the interviewees. As blind were classified 60.4 %, 22.9 % had poor vision, and 16.7 % were unspecified.

TABLE 1. Visual acuity

Vision defect groups		Visual acuity Maximum	Minimum	Fr	%	
1	Low vision	<0.3	≥0.1	44	11.3	22.9
2		<0.1	≥0.05	45	11.6	
3		<0.05	≥0.02	44	11.3	
4	Blind	<0.02	l.s.	135	34.7	60.4
5		no l.s.		56	14.4	
9		Unspec.		65	16.7	
Total				389	100.0	

In this study the degree of visual disability describes the functional disability caused by the handicap. The degree had been determined within five years for nearly 80 % of the interviewees. Over 60 % had a 100 % disability.

TABLE 2. Degree of visual disability

Degree of disability	Fr.	%	
60 - 69 %	11	2.9	37.7
70 - 79 %	35	9.1	
80 - 89 %	39	10.1	
90 - 99 % (Av. = 93.4)	60	15.6	
100 %	240	62.3	
Total	385	100.0	

The degree of disability as a percentage does not give an accurate picture of the actual state of vision. The interviewees were therefore asked how they see the objects listed in the table below.

TABLE 3. Estimated ability to see objects

Sees	%	n
- Moving objects outdoors, such as cars and people	65.8	389
- Familiar person when near	43.8	388
- Colours	59.2	387
- Traffic signs, traffic lights	41.4	389
- Street curb, steps	40.2	388

It is to be noted that three out of five visually handicapped do not see traffic signs or curbs or steps.

1.3. Cause of defect, age at onset of defect, and duration of defect

TABLE 4. Cause of visual defect

Cause (n = 388)	%
Degenerative illness	18.8
Congenital defect	18.6
Hereditary cause	12.1
Accident other than occupational	10.1
Inflammation	9.5
Metabolic illness	7.2
Occupational accident	3.9
Tumor	2.8
Poisoning	1.0
Other	16.0
Total	100.0

Among the men, 22.1 % had been blind from birth, and among the women 28.5 %. One man in three had become disabled at 21 to 40 years of age, but only one woman out of four.

TABLE 5. Age at onset of visual defect, by sex

Age, years	Men Fr.	%	Women Fr.	%	Total Fr.	%
Under 1 year	48	22.1	49	28.5	97	24.9
1-10	35	16.1	33	19.2	68	17.5
11-20	37	17.1	26	15.1	63	16.2
21-30	45	20.7	26	15.1	71	18.3
31-40	28	12.9	16	9.3	44	11.3
41-50	18	8.3	17	9.9	35	9.0
51-62	6	2.8	5	2.9	11	2.8
Total	217	100.0	172	100.0	389	100.0

Most of the interviewees had had their visual handicap for at least six years, three out of five over 20 years. Only 8 % had had their handicap no more than five years. Thus the difficult phases of the crisis reaction of becoming disabled were already over for most.

TABLE 6. Duration of visual handicap, by sex

Duration, years	Men Fr.	%	Women Fr.	%	Total Fr.	%
0-5	20	9.2	11	6.4	31	8.0
6-19	71	32.7	57	33.1	128	32.9
20-39	89	41.0	57	33.1	146	37.5
40-62	37	17.1	47	27.3	84	21.6
Total	217	100.0	172	100.0	389	100.0

1.4. Level of education

One out of three of the visually handicapped had only elementary school education, and one in ten had a high school or higher education. The difference between men and women was greatest among those who had at least high school education; in this group there were clearly more men.

TABLE 7. Education, by sex

Education	Men		Women		Total	
	Fr.	%	Fr.	%	Fr.	%
Elementary school	65	34.6	51	34.0	116	34.3
Vocational school or similar	79	42.0	67	44.7	146	43.2
Intermediate school	21	11.2	21	14.0	42	12.4
High school or academic	23	12.2	11	7.3	34	10.1
Total	188	100.0	150	100.0	338	100.0

Schools for the blind or the visually impaired had been finished by 50 (13 %) interviewees, and 22 (5.7 %) had at least attended such schools. This group is regarded in this study as those who have attended a school for the visually impaired.

TABLE 8. Attendance at schools for the visually impaired, by sex

	Men		Women		Total	
	Fr.	%	Fr.	%	Fr.	%
Has finished or attended	41	19.1	31	18.1	72	18.7
Has not attended	174	80.9	140	81.9	314	81.3
Total	215	100.0	171	100.0	386	100.0

A vocational school for the visually impaired had been finished by 129 (33.2 %) by the interviewees, and at least attended by 8 (2.1 %). Men had attended clearly more frquently than women.

TABLE 9. Attendance at vocational schools for the visually impaired, by sex

	Men		Women		Total	
	Fr.	%	Fr.	%	Fr.	%
Has completed or attended	89	41.0	48	27.9	137	35.2
Has not attended	128	59.0	124	72.1	252	64.8
Total	217	100.0	172	100.0	389	100.0

1.5. Residence area and time lived there

Residence areas were divided into four categories according to their traffic facilities. The first category comprises fully urban environments complete with streets, sidewalks, intersections, pedestrian crossings, lighting and buildings. The second category contains suburbs and municipal centres that resemble towns but have slightly less facilities. The third category includes suburbs and rural built-up areas that do not have the above facilities or only some of them. The fourth category includes the nearly unbuilt, sparsely populated rural areas that are crossed by a highway. The categories thus proceed from an urban environment to an unbuilt, natural environment. The aim of the categories was to find out if the urban/rural quality of the environment has any interaction with the mobility of the visually impaired.

Among the interviewees 61 % lived in towns, and 19 % in sparsely populated countryside. Two thirds of the rurals were men, while women lived in town more frequently than men.

TABLE 10. Residence area, by sex

Area	Men Fr.	Men %	Women Fr.	Women %	Total Fr.	Total %
Urban	73	33.8	73	42.7	146	37.7
Suburban	51	23.6	40	23.4	91	23.5
Rural, built-up	42	19.4	33	19.3	75	19.4
Rural, sparsely populated	50	23.2	25	14.6	75	19.4
Total	216	100.0	171	100.0	387	100.0

Nearly one visually impaired person out of three had lived in the same area over 21 years.

TABLE 11. Time lived in present area of residence

Time, years	Fr.	%
1-5	109	28.2
6-10	76	19.6
11-15	49	12.7
16-20 (Av.=16.7)	37	9.5
Over 21	116	30.0
Total	387	100.0

1.6. Hobbies

The interviewees were asked if they had active sports or excercising interests or other hobbies. Both questions could be answered by a primary and a secondary hobby. In this context the actual hobbies are not discussed, although the answers are listed; the item of interest is whether there are any hobbies or not as well as any independent mobility required by a hobby.

More than half (53.6 %) of the interviewees said that they are not active in sports or keeping fit. Nearly one out of five (18.6 %) had also a secondary sports or keep-fit hobby.

TABLE 12. Activity in sports or in keeping fit

Activity	Fr.	%
0. No sports or keep-fit activities	208	53.6
1. Outdoor activities, running, skiing	130	33.5
2. Swimming	10	2.6
3. Indoor keep-fit activities, ball games	15	3.9
4. Track and field	9	2.3
5. Gymnastics	12	3.1
6. Cycling	4	1.0
Total	388	100.0

Only one in four (26.3 %) had no special interests or hobbies. A second hobby was not reported by 43.4 %.

Table 13. Hobby and interests

	Fr.	%
0. No hobbies or interests	102	26.3
1. Listening recorded books	34	8.8
2. Reading literature	28	7.2
3. Camping, nature, gardening	32	8.3
4. Handicraft, crafts	41	10.6
5. Politics, activities in organizations	49	12.6
6. Music, singing, acting	71	18.3
7. Studying, languages	18	4.6
8. General interest in world's affairs	7	1.8
9. Various home games, TV, radio	6	1.5
Total	388	100.0

Most of the hobbies reported require moving on foot or by public transport.

1.7. Mobility willingness and mobility devices employed

TABLE 14. Mobility willingness

Willingness	Fr.	%
Wants more mobility	227	60.4
Doesn't want more mobility	149	39.6
Total	376	100.0

The visual handicap caused limitations in outdoor mobility to nearly four out of five (79.1 %) of the visually impaired. The nearest helper is often the spouse. Of the interviewees, 62.2 % were married or cohabiting, i.e. considerably more than in the Karjalainen study (46.3 %). With over 90 % most or all other people in the home environment were seeing. Only 16.5 % of the visually impaired lived alone.

One out of five of the interviewees did not need assistance on his various trips. Only one in ten did not always and easily get a seeing escort. 9.5 % (37) told that a guide was needed always when outdoors.

TABLE 15. Use of white cane

Use of white cane	Fr.	%	
Does not use cane	164	42.5	62.7
Sometimes uses cane	78	20.2	
Often uses cane	47	12.2	37.3
Always uses cane	97	25.1	
Total	386	100.0	

The use of a dog guide was asked with two questions, and answers to these tallied completely. A dog has to be used, if one is available. Keeping a dog makes it necessary to go out with it. 40 (10.3 %) of the interviewees had a dog guide. A dog was also used always (36) or frequently (4) by 40 interviewees. Those who have a dog guide move almost significantly ($p<.05$) more than those who do not have a dog.

It is significant that mobility devices are only aids. They do not move anyone, you have to set out yourself. They do not avoid obstacles, you have to be able to do that yourself. The more functions a mobility device contains, the greater is the information flood that the visually impaired must control and interpret correctly. The use of a mobility device requires learning and constant practicing, and before the device is used, you have to be able to move yourself.

Good control of mobility techniques and the cane, as well as full utilization of one's own resources are always the basic factors in independent and safe mobility.

1.8. Reliability of measurement and representativeness of results

The indicator used was a questionnaire form prepared for the study. The form contained both questions and multiple choices. Meetings were held with the interviewers to discuss the questions and to formulate them as unambiguously as possible. The significance of each question was also agreed on, i.e. what was intended to find out by each particular question.

The indicator was tested in a pilot interview, the experiences from which were used to prepare the final questions and to instruct the interviewers. Every attempt was made to make the indicator conceptually as clear as possible. Personal familiarity and a trusting relationship also made it easier to understand both the questions and the answers.

In connection with the AID analyses a variance analysis was also made for finding out how great a part of the dependent variable could by explained with individual independent variables and their interactions. For such a heterogeneous material the overall explanatory percentages were reasonably good. When looking for the best model, finally a percentage of 28.8 % was reached, which is to be regarded at least fair for this kind of study. Usually the result remains between 20 and 30 %.

The best value on the reliability of the dependent variables is each model's dependence percentage, which at best rose to near 30 %. The minimum value of the reliability of the dependent variable, as estimated from the covariance of the AID analysis, is .54. The F value was given for each test and was found to be statistically very significant.

In an attempt to ensure the logical validity of the measurement, simple sentence structures were used as well as unambiguous concepts that were familiar to the interviewees. If necessary, questions were further explained.

The level of measurement in this study lies somewhere between the rank and distance scales. The 'mobility on foot' variable is a combined variable. The first part of its categorization could be kept equidistant, but the last category had to include the extremely mobile end of the distribution, and the categorization could not be kept equidistant up to the end. The last category can be considered that of the extremely mobile.

The representativeness of the results is enhanced by the size of the sample. It is significant as well that nearly 93 % of the persons in the sample could be interviewed. Among those who could not be interviewed there is no apparent effect of a particular characteristic, while it is to be noted that there were no very severely disabled nor visually impaired with additional handicaps. The results can be generalized over the basic population.

2. TRAVEL ON FOOT AND BY PUBLIC TRANSPORT AND WILLINGNESS TO MOBILITY TRAINING

2.1. Travel on foot

The first dependent variable is travel on foot. It is a variable combined from the question, "How much do you move about on foot on the average 1) daily, 2) weekly, or 3) monthly?". Each interviewee gave an estimated kilometrage in one time position only. These answers were used to form a new variable that describes how many kilometres each interviewee moves on foot daily.

TABLE 16. Travel on foot: categories, category frequences and percentages

Travel on foot, average km/day		Fr.	%
1. 0.5 km/day[x)]		87	22.8
2. 1.5 km/day		79	20.7
3. 2.5 km/day	(Av.=3 km)	76	19.9
4. 3.5 km/day		29	8.1
5. 6.7 km/day		111	28.5
Total		382	100.0

[x)] The category value is the category average.

The first four categories are equidistant, the distances being 0 - 1 km, 1.1 - 2 km, 2.1 - 3 km, and 3.1 - 4 km. Half (56) of those in the last category reported a daily walking distance of 5 kilometres, and two thirds walked up to 6 km. The number of categories had to be limited for the analyses; therefore all others were included in the fifth category, giving it an average of 6.7 km.

Rather than studying the kilometrages, it is more important to determine the degree of mobility of the impaired person. The explanatory analyses are aimed at finding the factors associated with mobility on foot. The kilometrage estimate was asked for categorization, and the resulting categories could accordingly be named as follows:

Category 1: Extremely low mobility
Category 2: Low mobility
Category 3: Medium mobility
Category 4: High mobility
Category 5: Extremely high mobility

2.2. Travel by public transport

The second dependent variable is travel by public transport. The interview asked how many times during the preceding year the interviewee had used a bus or other form of public transport to travel in his own locality beyond his usual walking distance. Transport to work and long-distance travelling were excluded; the trips involved were thus those for shopping, therapy or treatment, visiting, or recreation. The essential item was the use of public transport, not the distance of the trip.

The answers were asked as the annual frequency, starting from zero and ending at 99. The latter count was meant to indicate trips so frequent that they could not be properly estimated. The data can best be described as the number of times per month. The categorization is made so that those who travel by public transport not more than once or not more than twice form separate categories, as the increase from one to two times is relatively more significant than, for example, from seven to eight. The categories are: 0 times per month, 0.1 - 1 times per month, 1.1 - 2 time, 2.1 - 8 times, and more than 8 times.

TABLE 17.Monthly travel by public transport:
categories, frequencies and percentages.

Travel by public transport, average number of times per month		Fr.	%	
1. Zero times		147	38.1	
2. 0.5 times } x)		102	26.4	
3. 1.5 times } x)		39	10.1	
4. 4.0 times } x)		61	15.8	61.9
5. Over 8 times	(Av.=21.2)	37	9.6	
Total		386	100.0	

x)The values for categories 2, 3 and 4 are the respective category averages.

Travel by public transport in the above is mostly an interval-scale variable. In the AID analysis the dependent variable may also be the dichotomy 'does not travel-travels'; the criterion is then the non-use or use of public transport, rather than the number of times. The dichotomy-based approach seems more logical that that based on the number of times, as exceeding the usage threshold is more decisive than the amount of usage. Furthermore, this approach eliminates any inaccuracy that might arise from the categorization.

2.3. Willingness to mobility training

The third dependent variable is the willingness to mobility training. The interviewees were asked their wishes on rehabilitation. Almost two out of three (64 %) were not interested in any kind of rehabilitation, and 36 % expressed a willingness to some form of rehabilitation. After excluding those who wished holidays, Braille training or work experiments, 32.1 % remained. The wished rehabiliation associated with mobility; training in mobility techniques, physical therapy, adjustment rehabilitation and low vision training.

3. FINDINGS

3.1. Willingness to mobility training, and involved independent variables associated with visual defect, impaired functionality, social disadvantage and personal characteristics

TABLE 18. Willingness to mobility training

Willingness to mobility training	Fr.	%	
Does not wish any rehabilitation	245	64.0	
Wishes training in mobility techniques	51	13.3	
Wishes physical rehabilitation	33	8.6	32.1
Wishes adjustment therapy	24	6.3	
Wishes low vision training	15	3.9	
Wishes holidays, camping	11	2.9	
Wishes Braille training	2	.5	
Wishes work experimentation	2	.5	
Total	383	100.0	

Willingness to mobility training was studied by means of discriminatory analysis with the intention of finding the variable combination that best discriminates those who wish such training from those who do not. The descriptive variables chosen included AID analysis variables and new variables of interesting content, 18 in all, all shown in the result table. The number of those who answered all questions was 286, including 186 who wished mobility training and 100 who did not. The variables had some high paired correlations but none that correlated systematically with many other variables and would therefore have had to be excluded.

TABLE 19. Discriminatory analysis according to wishes on mobility training (x114)

Variable	(n)	Original observation variables Group averages: Does not want mob. training	Original observation variables Group averages: Wants mob. tr.	Discr. analysis: Group diff. F	Group diff. p<	Discr. function; standard w. coeff. with discr.
1. Having hobbies	(242)	.67	.89	18.0	.001	.58
2. Willingness to move	(121)	1.54	1.71	7.7	.01	.57
3. Attending voc. school for vis. impaired	(49)	1.32	1.20	4.8	.05	-.52
4. Use of local transport in winter	(202)	7.0	8.5	.75	n.s.	-.42
5. Use of local transport in summer	(201)	6.1	7.9	1.1	n.s.	.39
6. Travel by public transport	(225)	17.2	22.8	2.2	n.s.	.28
7. Travel on foot av. daily	(299)	2.8	3.1	2.4	n.s.	.28
8. Dog guide available	(236)	1.07	1.13	2.8	n.s.	.27
9. Duration of visual defect	(297)	2.7	2.5	2.2	n.s.	-.25
10. Use of white cane	(239)	2.5	3.0	5.7	.05	.24
11. Time lived in residence area	(156)	17.6	18.2	.10	n.s.	.17
12. Chronological age	(2)	44.9	45.4	.11	n.s.	.15
13. Active in sports	(240)	.43	.54	3.1	n.s.	.13
14. Onset of visual impairment	(4)	19.6	22.5	2.0	n.s.	-.11
15. Degree of visual disability	(6)	92.5	94.4	1.8	n.s.	.05
16. Level of education	(298)	1.9	2.0	.73	n.s.	-.04
17. Attending school for visually impaired	(48)	1.11	1.10	.03	n.s.	.04
18. Does not need guide for mobility	(115)	1.91	1.92	.00	n.s.	-.01
Group averages with discriminator		-.3331	.6200	$\chi^2 = 51.92$		
				$p < .001$		
(n = 286)		(n=186)	(n=100)	$R_c = .41$		

Of the 18 descriptive variables in the table, the three first ones emerged as the most discriminatory: having hobbies, wish of mobility, and having attended a vocational school for the visually impaired. Those who have hobbies and expressed a wish of mobility want mobility training, while those who had attended a vocational school for the visually impaired do not. These three variables are best in separating the groups. A statistically almost significant discrimination is also obtained by the white cane variable: those who use a cane want mobility training.

This result is quite understandable. The starting point in mobility is the desire to move about. This can be due to many different factors, such as work, hobbies, social contacts etc. Many hobbies require mobility; therefore there is a desire for rehabilitation that improves or increases mobility. The use of a white cane is in itself a proof of active mobility. The value of the cane is known and acknowledged, but all of its possibilities are not yet known, and training is therefore desired. Those who want to be more mobile have also expressed such a wish. It is also understandable that those who have attended a school for the visually impaired do not want mobility training; they have received such training and are very likely to move about sufficiently and well.

The result of the analysis emphasizes the significance of the desire to move; bringing such a desire about and maintaining it. Mobility willingness is apparent with those who have hobbies and have received training in the use of the cane but not to a sufficient degree or in useful form. The entire training at vocational schools for the visually impaired is aimed at an independent life, and this apparently is reached.

The correlations of the best discriminative variables show that they function independently and should accordingly be separately attended to.

TABLE 20. Correlations between best discriminative variables.

Variable		242	121	49	237
242	Having hobbies	1.000			
121	Willingness to move about	.019	1.000		
49	Attending a VSVI	-.114	.148	1.000	
237	Use of white cane	.100	.117	.152	1.000

Willingness to mobility training is possessed by those visually impaired who

- have a hobby (other than sports or keeping fit),
- have expressed a desire to move more than at the time of the interview,
- use a white cane, or
- have not attended a vocational school for the visually impaired.

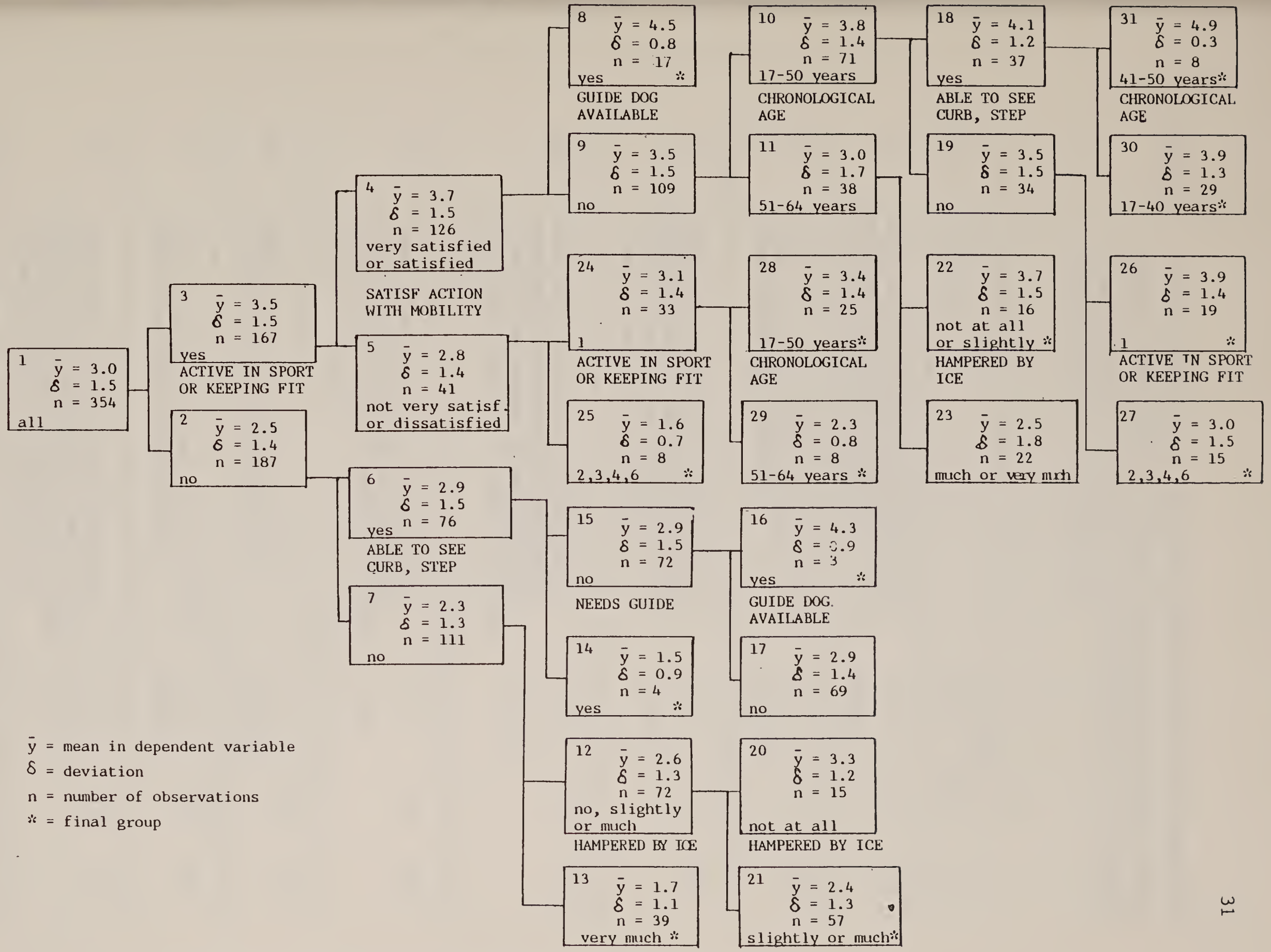
The use of a white cane is associated with compensation for impaired funcntionality. These persons have a desire to get moving. Those who have hobbies want to be able to move to avoid the social disadvantage of not being able to participate in all social activities. The remaining two factors are associated with personal characteristics.

3.2. Extent of travel on foot: descriptive results through interactions between visual defect, social disadvantage and personal characteristics.

Ten of the above cross-related factors were chosen for an AID study of their interactions with the extent of travel on foot. In an AID analysis the number of independent variables should be limited to ten. The variables were:

1) (x1, sex)
2) x2, age
3) x20, ability to see street curb
4) (x83, use of seeing helper)
5) x115, need of guide
6) x121, desire of mobility
7) x131, effect of ice on mobility
8) x236, use of dog guide
9) x240, active interest in sports or keeping fit
10) x258, satifaction with one's own mobility.

The dependence percentage of the analysis was 28.2. As the dependence percentage of the two variables in parentheses, x1 and x23, was zero, they were excluded from the analysis selected as the main analysis and resulting in a dependence percentage of 28.8.


1 ȳ = 3.0 δ = 1.5 n = 354 all
2 ȳ = 2.5 δ = 1.4 n = 187 no
3 ȳ = 3.5 δ = 1.5 n = 167 yes
ACTIVE IN SPORT OR KEEPING FIT
4 ȳ = 3.7 δ = 1.5 n = 126 very satisfied or satisfied
SATISF ACTION WITH MOBILITY
5 ȳ = 2.8 δ = 1.4 n = 41 not very satisf. or dissatisfied
6 ȳ = 2.9 δ = 1.5 n = 76 yes
ABLE TO SEE CURB, STEP
7 ȳ = 2.3 δ = 1.3 n = 111 no
8 ȳ = 4.5 δ = 0.8 n = 17 yes *
GUIDE DOG AVAILABLE
9 ȳ = 3.5 δ = 1.5 n = 109 no
10 ȳ = 3.8 δ = 1.4 n = 71 17-50 years
CHRONOLOGICAL AGE
11 ȳ = 3.0 δ = 1.7 n = 38 51-64 years
18 ȳ = 4.1 δ = 1.2 n = 37 yes
ABLE TO SEE CURB, STEP
19 ȳ = 3.5 δ = 1.5 n = 34 no
31 ȳ = 4.9 δ = 0.3 n = 8 41-50 years*
CHRONOLOGICAL AGE
30 ȳ = 3.9 δ = 1.3 n = 29 17-40 years*
24 ȳ = 3.1 δ = 1.4 n = 33 1
ACTIVE IN SPORT OR KEEPING FIT
25 ȳ = 1.6 δ = 0.7 n = 8 2,3,4,6 *
28 ȳ = 3.4 δ = 1.4 n = 25 17-50 years*
CHRONOLOGICAL AGE
29 ȳ = 2.3 δ = 0.8 n = 8 51-64 years *
22 ȳ = 3.7 δ = 1.5 n = 16 not at all or slightly *
HAMPERED BY ICE
23 ȳ = 2.5 δ = 1.8 n = 22 much or very much
26 ȳ = 3.9 δ = 1.4 n = 19 1 *
ACTIVE IN SPORT OR KEEPING FIT
27 ȳ = 3.0 δ = 1.5 n = 15 2,3,4,6 *
15 ȳ = 2.9 δ = 1.5 n = 72 no
NEEDS GUIDE
16 ȳ = 4.3 δ = 0.9 n = 3 yes *
GUIDE DOG. AVAILABLE
14 ȳ = 1.5 δ = 0.9 n = 4 yes *
17 ȳ = 2.9 δ = 1.4 n = 69 no
12 ȳ = 2.6 δ = 1.3 n = 72 no, slightly or much
HAMPERED BY ICE
20 ȳ = 3.3 δ = 1.2 n = 15 not at all
HAMPERED BY ICE
13 ȳ = 1.7 δ = 1.1 n = 39 very much *
21 ȳ = 2.4 δ = 1.3 n = 57 slightly or much*

ȳ = mean in dependent variable
δ = deviation
n = number of observations
* = final group

FIG. 1. DESCRIPTION OF TRAVEL ON FOOT WITH INTERACTIONS OF EIGHT VARIABLES

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Table 21. Travel on foot: eleven descriptive groups obtained from interactions between sports activity, attitude towards manner of mobility, ability to see street curb, use of dog guide, chronological age, experiencing ice as a difficulty, and need of guide.

Group	Description	Mean [1)]	Size	%
8	Those active in sports or in keeping fit, using dog guide, and satisfied or very satisfied with their manner of mobility	4.5 (4 km)	17	4.8
16	Those not active in sports, using dog guide without guide, able to see curb	4.3 (3.8 km)	3	0.8
18	Those active in sports or in keeping fit, moving without dog guide, at least satisfied with their manner of mobility, under 50 years of age, able to see curb	4.1 (3.6 km)	37	10.5
22	Those active in sports or in keeping fit, moving without dog guide, at least satisfied with their manner of mobility, 51 to 64 years old, not at all or slightly hampered by ice	3.7 (3.2 km)	16	4.5
19	Those active in sports or in keeping fit, moving without dog guide, at least satisfied with their manner of mobility, under 50, not able to see curb	3.5 (3 km)	34	9.6
20	Those not active in sports, not able to see curb, not at all hampered by ice	3.3 (2.8 km)	15	4.2
17	Those not active in sports, moving without guide or dog guide, able to see curb	2.9 (2.4 km)	69	19.5
23	Those active in sports or in keeping fit, moving without dog guide, at least satisfied with their manner of mobility, 51 to 64 years old, much or very much hampered by ice	2.5 (2 km)	22	6.2

continued

Group	Description	Mean [1]		%
21	Those not active in sports, who do not see curb, who are slightly or very much hampered by ice	2.4 (1.9 km)	57	16.1
13	Those not active in sports, who do not see curb, who are very much hampered by ice	1.7 (1.2 km)	39	11.0
14	Those not active in sports, who see curb, who always need guide outdoors	1.5 (1 km)	4	1.1
Entire group		3.0 (2.5 km)	354	

[1] Categories 1 to 5

The regression coefficients of the variables were computed in the analysis for finding the dependence percentages of the individual variables and of the entire model.

Dependence percentage of entire model is 28.8 %

Numbering:

1 = sports or keeping fit
2 = effect of ice on mobility
3 = chronological age
4 = satisfaction with mobility
5 = able to see curb and steps
6 = use of dog guide
7 = need of guide
8 = desire of mobility
9 = unexplained portion

FIG. 2. Dependence percentages of entire model and of eight individual variables descriptive of mobility on foot ($F = 9.1$, $p < .001$).

The above factors explain nearly 30 % of mobility on foot, and the dependence percentage is statistically very significant.

3.3. Travel by public transport: descriptive results from interactions between visual defect, social disadvantage and personal characteristics

When selecting the variables, it was decided to classify the 'travel by public transport' as the dichotomy 'travels/does not travel'.
The dependent variables for the first analysis were selected on the basis of significance tests, resulting in nine variables: 1) chronological age, 2) disability degree of visual defect, 3) field defect, 4) ability to see moving objects outdoors, 5) ability to see colours, 6) ability to see traffic signs and lights, 7) ability to see street curbs and steps, and 9) extent of education.

The dependence percentage of the model was only 11.8 %; therefore a better model had to be found for travel by public transport.

The independent variables for the second model were chosen as follows:

1) x1, sex
2) x2, age
3) x4, age at onset of visual defect
4) x6, disability degree of visual defect
5) x10, visual acuity
6) x49, attending a vocational school for the visually impaired
7) x115, need of guide
8) x154, urban/rural quality of residence area
9) x297, duration of visual defect
10) x298, extent of education.

An AID analysis with the above variables resulted in a dependence percentage of 23.8 % for travel by public transport.

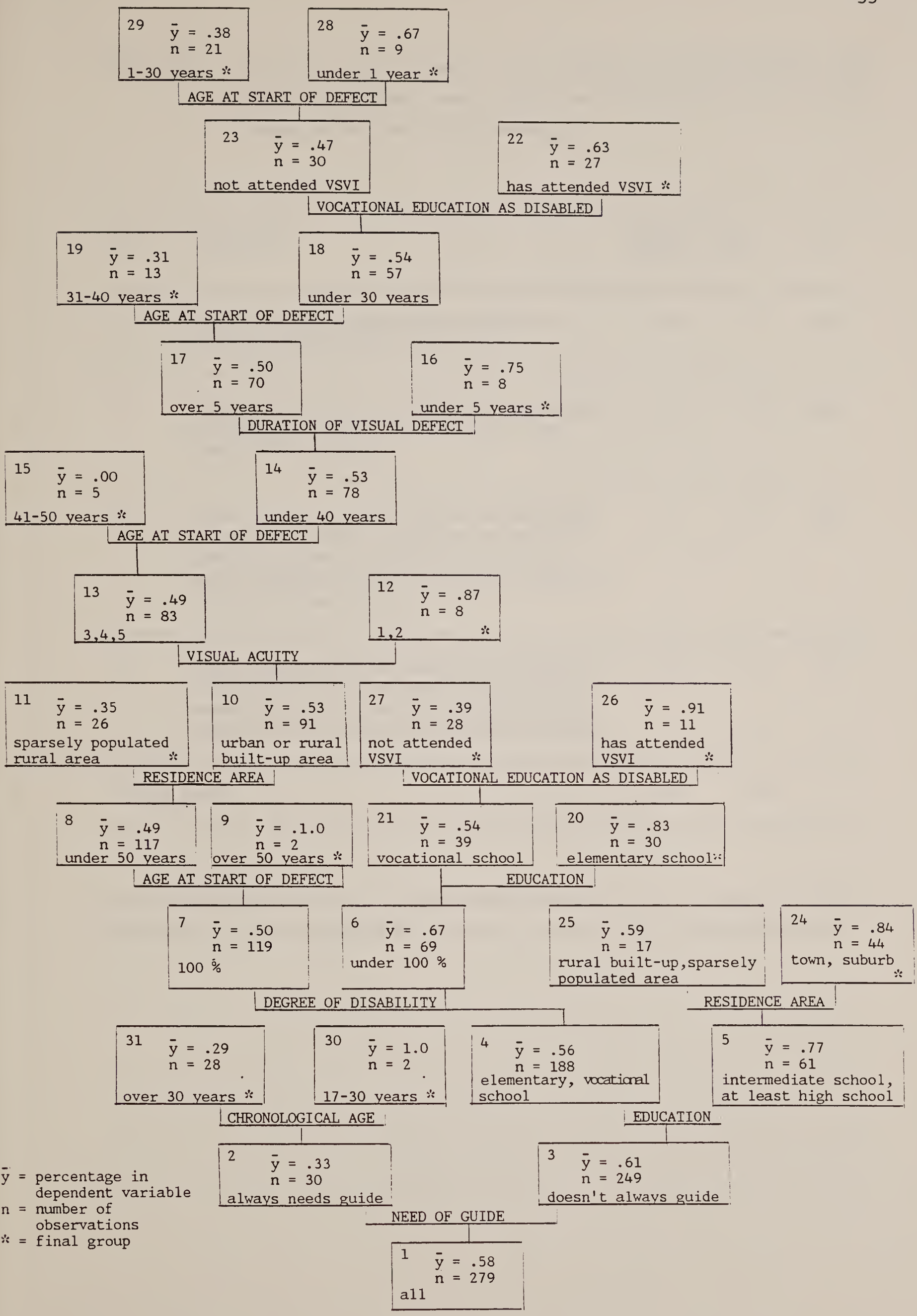
29 ȳ = .38 n = 21 1-30 years *
28 ȳ = .67 n = 9 under 1 year *
AGE AT START OF DEFECT
23 ȳ = .47 n = 30 not attended VSVI
22 ȳ = .63 n = 27 has attended VSVI *
VOCATIONAL EDUCATION AS DISABLED
19 ȳ = .31 n = 13 31-40 years *
18 ȳ = .54 n = 57 under 30 years
AGE AT START OF DEFECT
17 ȳ = .50 n = 70 over 5 years
16 ȳ = .75 n = 8 under 5 years *
DURATION OF VISUAL DEFECT
15 ȳ = .00 n = 5 41-50 years *
14 ȳ = .53 n = 78 under 40 years
AGE AT START OF DEFECT
13 ȳ = .49 n = 83 3,4,5
12 ȳ = .87 n = 8 1,2 *
VISUAL ACUITY
11 ȳ = .35 n = 26 sparsely populated rural area *
10 ȳ = .53 n = 91 urban or rural built-up area
27 ȳ = .39 n = 28 not attended VSVI *
26 ȳ = .91 n = 11 has attended VSVI *
RESIDENCE AREA
VOCATIONAL EDUCATION AS DISABLED
8 ȳ = .49 n = 117 under 50 years
9 ȳ = .1.0 n = 2 over 50 years *
21 ȳ = .54 n = 39 vocational school
20 ȳ = .83 n = 30 elementary school *
AGE AT START OF DEFECT
EDUCATION
7 ȳ = .50 n = 119 100 %
6 ȳ = .67 n = 69 under 100 %
25 ȳ .59 n = 17 rural built-up, sparsely populated area
24 ȳ = .84 n = 44 town, suburb *
DEGREE OF DISABILITY
RESIDENCE AREA
31 ȳ = .29 n = 28 over 30 years *
30 ȳ = 1.0 n = 2 17-30 years *
4 ȳ = .56 n = 188 elementary, vocational school
5 ȳ = .77 n = 61 intermediate school, at least high school
CHRONOLOGICAL AGE
EDUCATION
2 ȳ = .33 n = 30 always needs guide
3 ȳ = .61 n = 249 doesn't always guide
NEED OF GUIDE
1 ȳ = .58 n = 279 all
ȳ = percentage in dependent variable
n = number of observations
* = final group

FIG. 3. DESCRIPTION OF TRAVEL BY PUBLIC TRANSPORT WITH INTERACTIONS OF TEN VARIABLES

TABLE 22. Travel by public transport: four dichotomy groups obtained from interactions between need of guide, level of education, age at onset of visual defect, and area of residence.

Group	Description	Mobility %	Size	%
5	Those moving without guide, with intermediate or high school education	77	61	21.9
6	Those moving without guide, with elementary or vocational school education, with less than 100 % disability	67	69	24.7
10	Those moving without guide, with elementary or vocational school education, with 100 % disability, living in rural built-up areas or larger population centres, who were under 50 at onset of visual defect	53	91	32.6
11	Those moving without guide, with elementary or vocational school education, with 100 % disability, living in sparsely populated rural areas, who were under 50 at onset of defect	35	26	9.3
Entire group		58	279	

Regression coefficients of the variables were calculated in the analysis for finding the dependence percentages of the individual variables and of the entire model.

Dependence percentage of entire model is 23.8 %

Numbering:

1 = level of education
2 = age at onset of visual defect
3 = attending a VSVI
4 = need of guide
5 = area of residence
6 = degree of visual disability
7 = visual acuity
8 = chronological age
9 = duration of visual defect
10 = sex
11 = unexplained portion

FIG. 4. Dependence percentages of entire model and of ten individual dichotomy variables for travel by public transport ($F = 5.5$, $p < .001$).

The above factors explain almost a quarter of travel by public transport, and the dependence percentage is statistically very significant.

Education level, age at onset of defect, and attending a vocational school for the visually impaired explain over half of the model's dependence percentage.

3.4. Summary of the results

Travel on foot is a primary function and a prerequisite for the use of public transport. The extent to which such transport is used is not as important as readiness for its use. This summary also discusses the use of public transport on the basis of the above Automatic Interaction Detector (AID). It is the intention to see which factors describe travel on foot and by public transport, and what conclusions can be drawn for possibly providing and arranging mobility training. The discussion proceeds by individual variables, mainly the variables included in the AID analyses.

Sex. Sex alone did not explain the travel of the visually impaired on foot or by public transport. Its share in explaining the interactions of mobility on foot was modest, but did divide those who moved without a guide and had no higher than intermediate school education into men, who were more mobile, and women, who moved less. Sex did not in any way divide travel by public transport, but a higher percentage of those moving without a guide and having an intermediate or high school education used public transport more than those with elementary or vocational school education (77 % vs. 56 %), and 2/3 of them are men.

Sex, of course, cannot be affected by training, but subject to the above qualifications, it is to be noted in general that men are more mobile than women. Men have more knowledge of traffic, and they only need a motive to set out. Women expect a guide, and safety at the same time. Perhaps this is partly due to social role differentiation, perhaps visually impaired women are more timid than men about going out. This is also indicated by Bikson's finding that visually handicapped women are clearly more limited in general orientation ($p<.01$), general mobility ($p<.05$) and bus travel ($p<.01$).

The group of those who desired more mobility divides almost equally between men and women, while among those who do not wish to move more, two thirds are men. Willingness to mobility training should be asked especially from women, who, being afraid that are not able to move, do not even want to move. Travel on foot or by public transport did not discriminate those who desired mobility training from those who did not. This was also the case with the level of education, but desire to move about was a significant discriminator.

Age. Age explains alone travel both on foot and by public transport. The group of the youngest visually impaired travel on foot mostly in the categories 'a little' and 'moderately', but are the most frequent users of public transport. Apparently they walk short distances to public transport to go to work or during their free time. The older groups walk more, probably in part to keep fit, as their use of public transport is infrequent and non-use is common. On the other hand they may have more vehicles available in the family than the younger.

Age interactions do not explain the use of public transport. Already at an early stage it divides in two the group needing a guide, but the division is not important. There is no other division by age. In the group using a guide and having at least intermediate school education 77 % use public transport, two thirds of them under 41. The use of public transport is associated with the younger age groups and with higher levels of education. Young people have nowadays received more and better occupational rehabilitation than the older age groups. It is quite likely

that the habit of using public transport learned when young will be retained later. Bikson noted that the age group is less significant a factor than expected in the various functions of the visually impaired, but that education has an almost significant effect ($p<.05$) on the use of public transport. Education opens more possibilities of work and hobbies, and thereby means a need for public transport.

Age did not discriminate mobility training willingness groups; it is therefore best to inquire willingness to mobility training from persons 30 to 49 years of age who move frequently on foot but do not use public transport.

Age at onset of visual defect. This factor did not explain the extent of travel on foot nor the use of public transport, neither did it explain willingness to mobility training.

There is a very significant interaction between the age at the onset of the visual defect and changing the area of residence. The visual defect has an increasing effect on changing residence up to the 30th year. After this the visually impaired stays at his present residence area, in which case any mobility training must be made for that area. Preceding mobility training should emphasize the general principles of mobility.

An evaluation of the interactions reveals an interesting thing. As an describer of mobility on foot the age at the onset of the defect is last, and did not once during the analysis discriminate groups. The results indicate that those who become disabled in their childhood move on foot quantitatively more than those who lose their sight at a later age. As explainer of travel by public transport the age at the onset of the defect is second, accounting for 18 % of the model's dependence percentage. Public transport is used by more of those who become disabled at an early age than of those who suffer disablement later. A blind child or young person learns to use it early, and the habit continues in adulthood. Those who become disabled at a later age are used to travel on foot, and difficulties may be encountered in learning to use public transport after becoming disabled. On the other hand, an older person may have a vehicle available, which reduces the need of using public transport.

Degree of disability. 62 % of the interviewees had a 100 % disability; i.e. the visual acuity of both eyes was below 0.1. This does not mean that the visually impaired placed in this category would not see anything. About one in five is able to use some residual sight in moving about.

The degree of disability as an individual factor does not explain the extent of moving on foot. Those with 100 % disability would like to move on foot more than they do, but they require a guide. Hearing and a cane help their mobility, while residual sight does not assist as much as with those having a 60-99 % disability. Willingness to mobility training is not explained by the degree of disability, but the expressed desire of moving more indicates that especially those with 100 % disability should be offered mobility training and that they should practice the methods that are most helpful in their mobility.

The degree of disability had a significant effect on the extent of using public transport, but in the interactions it is only one factor in the use of public transport. It divides the group only once, but is involved both in the groups that use public transport and in those that do not. Other factors, the urban/rural factor for example, decide more accurately the use or non-use of public transport. Among the rural 100 % disabled, few use public transport, but most of the urban or suburban 100 % disabled do. Different education backgrounds were discussed above. Work and having hobbies are more significant in the use of public transport than the disability percentage.

Visual acuity. Those in visual acuity categories 4 or 5 require a guide for mobility, while for the others a motive is sufficient. The mobility of those in these two categories is best helped by hearing and a cane, while those with the least disability are best helped by residual sight. Visual acuity has an almost significant interaction with moving on foot, but the effect does not decrease linearly towards complete blindness. Visual acuity category 1 is the smallest group in the extremely low and extremely high mobility categories, and is the largest in the high mobility category. Such persons apparently move sufficiently to work and hobbies. The other categories are more often in the extremely low and extremely high mobility categories, the latter apparently to keep fit, as indicated by the interaction analysis.

Visual acuity accounts for 11 % of the entire dependence percentage of mobility on foot. It is the fifth most significant factor, and divides the groups three times. At the fourth phase visual acuity divides men having no higher than intermediate school education and moving without a guide (n=129) into more mobile completely blind persons (category 5, n=27) and into less mobile other categories (n=102). Next discrimination separates from this group those living in town, who are almost as mobile as the blind group above. The remaining two divisions at the end of the analysis concern women. Compared with men, visual acuity divides women in the exactly opposite way; the most mobile women are those in visual categories 1, 2, 3 and 4. In the men's group considerably many had been blinded

before or after the the war, and 44 % of these would like to move still more. Visual acuity did not divide the willingness to mobility training groups, but the expressed desire of more mobility did. Thus the persons in this group should be personally asked their need of training.

As an individual factor visual acuity did not explain the extent of using public transport. Through interactions it was the seventh, accounting for 1.6 % of the dependence percentage of the entire model.

Attending a vocational school for the visually impaired. A vocational school for the visually impaired (VSVI) had been finished or at least attended by 35 % of the interviewees, by 41 % of the men and 28 % of the women. Attendance at such a school was an almost significant factor in discriminating those who wished mobility training from those who did not. Those who had attended a vocational school for the visually impaired dis not want mobility training.

Attendance at a vocational school for the visually impaired does not explain the extent of mobility on foot, neither does it play any significant part through interactions. It divides the group once, and even that at the last phase concerning women with 100 % disability. On the men's side attending a VSVI is not a discriminator.

As an individual factor in the extent of public transport use the attendance at a vocational school for the visually impaired is significant. In this respect it is through interactions the third, accounting for 15 % of the dependence percentage of the entire model.

Attending a vocational school for the visually impaired does not explain the extent of travel on foot, as those who have attended a VSVI use public transport. For the young visually impaired a VSVI has an effect in getting a vocation and work, and in developing social relationships, thereby affecting ordinary moving on foot, but leads to the use of public transport to a significantly higher extent than among those who have not attended such a school.

Need of guide. A guide was always needed outdoors by 9.5 % of the interviewees. Of those who needed a guide, nearly two thirds lived in built-up municipal areas (39 %) or in the country (25 %). 95 % of those living in towns or suburbs do not need a guide.

Need of a guide does not in any way explain the willingness to mobility training. It does explain the extent of travel on foot ($p<.01$) and by public transport ($p<.05$). The use of a seeing helper is also almost significant in the amount of travel on foot, thus supporting the significance of the need of a guide.

The need of a guide accounts for 13 % of the dependence percentage of travel by public transport. Again it divides the entire group at the first phase. In the group moving without a guide 61 % uses public transport, compared with only 33 % among those who need a guide. Almost all of those who need a guide (n=30) are over 30 years old (n=28).

An important prerequisite to self-sufficient life is the visually impaired person's independent mobility. The necessity of a guide restricts independence. As the need of a guide does not explain willingness to mobility training, it should be asked from those visually impaired who actively express their desire of training and who use a cane to compensate for their impaired mobility.

Willingness to move. 60 % of those interviewed wanted to move more than they did at the time of the interview. Some of the visually impaired were already quite mobile but wanted to increase their mobility. Some did not move about at all and wanted to start. The prerequisites for moving that were most frequently mentioned were getting a guide or a motive. A wish for more mobility was expressed by the 100 % disabled, those who were not active in sports/keeping fit, those who did not want training, and those who did not have or had not had a driving licence.

The wish of moving only concerned moving on foot. It is very significant in explaining travel on foot by the visually impaired. In this respect the low mobility category emerges in particular.

In evaluating the main analysis, it can be noted that willingness is second best over the entire group, but in the course of the analysis it is the second six times, does not once divide the group, and is the eighth, or last, descriptive variable. Willingness to move is a strong background factor but is not visible in dividing groups into groups far apart.

Effect of ice on mobility. Ice was felt to hamper mobility at least slightly by 86 % of the visually impaired. As an individual factor ice on the route explains almost significantly the moving on foot of the visually impaired. Experiencing difficulties increases linearly the extremely low mobility group and reduces the extremely high mobility group.

Residence area. The area of residence does not cause statistically significant differences in the amount of travel on foot. In interactions it is the fourth, accounting for 11 % of the entire model's dependence percentage.

The residence area causes a significant difference in the extent that public transport is used. In an interaction study of the use of public transport it is fifth, accounting for 9 % of the entire model. Over the entire group it is sixth.

The area of residence was included in the first discriminatory analysis and did not emerge as a significant discriminator of willingness to mobility training groups. In the second analysis it was no more used as a discriminator, but the duration of living in the area did not discriminate those who wished moving and those who did not.

Use of dog guide. A dog guide is used by 10.3 % of the visually impaired. Acuiring a dog guide indicates an active attitude to mobility. Keeping a dog requires that it is walked every day. The users of dog guides move on foot almost significantly more than those who move without a dog.

The use of a dog guide did not discriminate willingness to mobility training groups significantly.

Active interest in sports or in keeping fit. 46 % of the visually impaired participate actively in sports or in keeping fit. Most go for outdoor sports, run or ski. Those who are active in sports/keeping fit are significantly more mobile than those who are not. Sports/keeping fit did not significantly discriminate willingness to mobility training groups.

By interactions sports/keeping fit is third best over the entire group. It divides the group three times during the analysis, and accounts for 11.9 %, or 41 % of the entire model's dependence percentage.

Satisfaction with one's own mobility. This variable was included in the interaction analysis because its almost significant individual result. As a discriminator of the entire group it is the fifth best variable.

The group of those who were at least satisfied with their mobility divides by different variables into 12 groups, in which (with the exception of one group) the average travel on foot is at least equal to the mean of the entire group. The exception is the group of visually impaired who feel that ice hampers their mobility much or very much. In the group of highest mobility all use a dog guide. In the group nine out of ten are men, and all except one are 100 % disabled. With two thirds the defect has lasted over 20 years, indicating little mobility training. It is likely that these persons just have started out and are now satisfied with their abilities.

Duration of visual defect. Only 8 % of the interviewees had had their defect up to five years. With 59 % the duration was over 20 years. It is evident that the crisis reactions due to recent disablement no more affected their mobility. Each had in his own way grown accustomed with the defect and had acquired membership in a regional association of the Central Association.

The duration of the defect did not explain willingness to mobility training. Neither did it as an individual factor explain travel on foot or by public transport.

Level of education. Education does not significantly discriminate willingness to mobility training groups, and neither does it as an individual factor explain travel on foot or by public transport.

In the interaction analysis of travel on foot the level of education is the fourth best variable over the entire group. In the analysis it divided the group three times, and was the second best variable, accounting for 3.5 %, or 17 % of the entire model's dependence percentage.

As mentioned earlier, the level of education is significant as an indirect mobility factor. Education determines the vocation and job, therefore having an influence on the need of mobility as well. On the other hand education provides through studies hobbies and social relations, thereby affecting the extent of travel on foot and use of public transport.

The following table summarises for the above factors their individually descriptive interactions, both signficant and non-significant, with mobility on foot and by public transport.

TABLE 23. Mobility on foot and by public transport: individually descriptive significant and non-significant factors, including disability category (1 = visual defect, 2 = impaired functionality, 3 = social disadvantage, 4 = personal characteristics).

Factor	Disability category	On foot	By public transp.
Sex	4	n.s.	n.s.
Age (old people move more on foot, younger by public transport)	4	.05	.01
Age at onset of defect	4	n.s.	n.s.
Degree of visual disability (the higher, the more public transport is used)	2	n.s.	.01
Visual acuity (the poorer, the less moving on foot)	1	.05	n.s.
Vision estimates	4	n.s.	n.s.
Hearing	4	n.s.	n.s.
Marital status	4	n.s.	n.s.
Attending vocational school for visually impaired (more use of public transport)	4	n.s.	.01
Attending adjustment course	4	n.s.	----
Use of seeing helper (users of helper move less on foot)	2	.05	----
Use of dog guide (users of dog move more on foot)	2	.05	----
Use of white cane	2	n.s.	----
Need of guide (those who need guide outdoors move less on foot and by public transport)	2	.01	.05
Willingness to move (those who move less want to move more on foot)	4	.001	----
Illnesses	4	n.s.	n.s.
Residence area urban/rural (those living in country use public transport less)	3	n.s.	.01
Effect of ice on mobility (those who are more hampered by ice move less on foot)	3	.05	----
Distance from home to bus stop etc. (the closer the stop, the more public transport is used)	3	----	.05
Active in sports/keeping fit (those who are more active move more on foot)	4	.001	----
Duration of visual defect	4	n.s.	n.s.
Level of education	4	n.s.	n.s.

4. DISCUSSION

To reach the aim of the study, a description was made of visually impaired adults' visual defect, impaired functionality, social disadvantage and personal characteristics. A study was made as well of visually impaired persons' mobility on foot and by public transport and willingness to mobility training. Mobility was treated as a both descriptive and dependent variable.

Mobility difficulties affect the social disadvantage felt by the visually impaired. During recent years many new fields of work, automatic data processing for example, have expanded the occupational possibilities of the visually handicapped, but mobility remains the central and most difficult problem. The social and economic deprivation experienced by the visually impaired can be reduced by improving mobility. In this study the 'social disadvantage' category only includes environmental obstacles to mobility, although e.g. an attempt could be made to compensate for impaired functionality through selection of a suitable area of residence. On the other hand, it is not possible for all visually impaired to choose their residence areas.

4.1. The results in relation to the aim of the study

The aim of the study was to help in arranging mobility training for the severely visually impaired and in guiding those willing into such training. The goal in mobility training of the visually handicapped can be considered to be the achievement of a self-sufficient mobility independent of others. From this point of view it is up to the visually impaired person himself to decide on his mobility as he sees fit. The study starts from the fact that in some cases some factor other than the impaired person's own will has emerged as decisive concerning mobility. If it had a significant interaction with mobility, it was regarded as descriptive of mobility. Attempts should be made to influence such factors in mobility training. Significant variables descriptive of mobility on foot that can be affected pedagogically include such factors as visual acuity (cf. mobility of low-vision persons), use of a dog guide (limitedly), and activity in sports or in keeping fit (taking up and maintaining the activity). Desire for mobility can be indirectly increased by providing a motive for it. If a factor has no significant interaction with mobility, it does not describe mobility and is useless in this context. For example, according to this study factors such as age at the onset of the defect, duration of defect, and acuity of hearing are not significantly descriptive of mobility.

A significantly descriptive factor in travel by public transport is attending a vocational school for the visually impaired. Here the same approach can be taken as in the above with hobbies: preparation should be made for a new phase in life. Motivation for using public transport can arise through vocation, work and job as well as mobility training and practice received at the school. Those who had attended a vocational school for the visually impaired were not willing to mobility training. Their degree of independence is apparently high enough and need not be increased.

The most significant descriptive variable in visually impaired persons' mobility on foot was willingness to move, rightly, as it should be the decisive factor in mobility. The aim of mobility training is to improve the self-sufficiency of the visually impaired person through mobility independently of others. 60 % of the visually impaired wanted to move more than they did at the time of the interview, but 64 % did not want mobility training. In the case of the latter there may be some fear of losing dependency, but on the other hand some of the visually handicapped already were so mobile that there is no need for more. Training activities should be directed to those who want more mobility.

Willingness to mobility and to mobility training are factors associated with motivation. If a visually impaired person has no reason to go somewhere, he will not set out. If mobility causes hazardous situations, it is understandable that it is not taken up. Mere provision of training services is not enough. Both Kuotola and Suikkanen note the difficulty of motivation for participating in training courses. Taking up training is prevented by many kinds of prejudices, domestic hindrances, illnesses, long distances, and fears. The major question arising from this study is how to motivate a visually impaired person to training; what means could be used to arouse motivation.

On the other hand there is reason to ask whether there should be any increase in the mobility of the visually impaired. According their own estimates, the average daily walking distance of the visually impaired was three kilometres. The average for the least mobile groups in the AID analyses was over one kilometre per day. According to a study by the Roads and Waterways Administration, the average daily distance walked by Finns was 1.15 km. The visually impaired do not have available all the means of moving that persons with normal vision have, possibly resulting in longer walking distances. In any case it can be noted that the results of this study give no reason to worry about the distances walked by the visually handicapped. Mobility safety seems to be good as well. On the other hand it should be borne in mind that there are visually impaired persons who do not move about except weekly or monthly or only with a seeing guide.

Mobility training should be planned according to the personal needs of each individual person and should be first offered to those willing to accept mobility training, such as: 1) those who have expressed a desire for moving about, 2) those who have hobbies of some kind, 3) white cane users, and 4) those who have not attended a vocational school for the visually impaired.

Secondly the arrangers of mobility training should direct their interest to those visually handicapped who have very low mobility. Such groups emerged in the AID analyses. Persons who moved very little include groups such as: 1. "Those who always need guide outdoors", (n=28). 2. "Those not active in sports, who do not see curb, who are hampered by ice", (n=96). 3. "Women who move without guide, who have no higher than intermediate school education", (n=43). 4. "Men who move without guide, who do not live in towns, who sense light", (n=43).

Groups have been combined for this summary. Although the groups partially overlap, they still contain some 34 % of the severely visually impaired persons.

As a practical result of the study the Central Association of the Visually Handicapped could arrange for its members a simple questionnaire, which would yield indications of the amount of mobility, its prerequisites, and willingness to mobility training. As the demographic information has already been recorded; the visually impaired should be asked:

1. How much do you move outdoors on foot daily?
2. Do you always need a guide outdoors?
3. Would you like to move more than you do at present?
4. Do you wish mobility training?

Mobility training includes the use of public transport. The answers can be used to indicate those willing to accept mobility training and those needing it. The names could then be forwarded to regional secretaries, who would provide the necessary guidance or motivation.

4.2. Suggested further research

The most important item arising from this study for further research is to find out the willingness of the visually impaired person to be mobile. A person's own attitude is important already when training is seeked or offered. Mobility training has been provided in Finland to some extent, but only a part of the visually impaired have taken advantage of it. A mobility skills instructor course was arranged in 1985, so more training possibilities will be provided. How to arouse a desire for mobility in the visually impaired?

An interesting question for further study is whether the visually impaired are more mobile in such locations where obstacles to mobility have been charted and cleared, than in locations where such improvements have not been made. What is the role of the environment in mobility? Shall the responsibility be borne by the visually impaired themselves and by their Central Association? What is the influence of persons with normal vision?

What part do the attitudes of the seeing play in the mobility of the visually impaired? There were few traffic mishaps or accidents involving the interviewees even though the average distance walked daily was three kilometres. The results show that the visually impaired are careful in traffic. Cooperation with the seeing helps further to reduce such mishaps and accidents. Meeting constantly more visually impaired in traffic will improve the attitudes of the seeing towards them, and will also show in general that many possibilities exist for the visually impaired in life.

Society offers today a good basic education to the visually handicapped. Possibilities exist up to the highest academic degrees, and new vocational fields have been found. It is to be hoped that proper environmental solutions could be found for helping the visually impaired to take part in social life.

The number of visually handicapped children integrated into municipal school systems has increased constantly during the first half of the 1980's. An interesting object for study would be the effect of integration on the mobility of the visually impaired. Children attending a school in their own municipality evidently move more than children attending a school for the visually impaired. The latter are often hampered by additional handicaps. It is likely that friendships born at school lead to an increased need of moving, and thereby to increased mobility after the integrated schooldays. The results of this study point out the significance of motivation to mobility. Training and the environment remain secondary in comparison. School integration may arouse a desire for mobility.

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